5 de JUNIO de 2024

12.00 h
Aula, Edifício I+D
Campus Río Ebro

INMA Junior

The journey of extracellular vesicles as Trojan Horses of nanoparticles against cancer

María Sancho
INMA-CSIC/UNIZAR

Nanomedicine was heralded as the solution to the lack of the treatment efficacy against cancer, and indeed, a large variety of nanovectors have been developed with exciting therapeutic properties. In particular, the delivery of therapeutic nanoparticles (NPs) to cancer sites needs to be dramatically improved, and this likely involves radically novel strategies and/or NP design. In the last years, the "Trojan Horse" concept has been postulated as an emerging strategy for enhancing tumor targeting efficiency. Among "Trojan Horse" strategies, extracellular vesicles (EVs) appear to hold the greatest potential as tools for the solution of the targeting challenge. They are nanovesicles (50-120 nm of diameter) from endocytic nature secreted by almost all cell types. But how can we engineer EVs for selectively delivering NPs to target tumors? In this seminar, we will discover several multidisciplinary approaches based on the latest advances in the field of nanomedicine and in the area of the EVs.

A simple and versatile strategy for oriented immobilization of His-tagged proteins on magnetic nanoparticles

Christian Castro Hinojosa
INMA-CSIC/UNIZAR

Oriented and covalent immobilization of proteins on magnetic nanoparticles (MNPs) is essential for biomedical applications and results particularly challenging as it requires both the functionality of the protein and the colloidal stability of the MNPs to be preserved. In this communication, I will describe a simple, and efficient strategy for MNP functionalization with proteins using metal affinity binding. The strategy consists of a single-step process where MNPs are functionalized using a preformed, ready-to-use nitrilotriacetic acid-divalent metal cation (NTA-M2+) complex and polyethylene glycol (PEG) molecules. As a proof-of-concept, we demonstrate the oriented immobilization of a recombinant cadherin fragment (membrane protein) engineered with a hexahistidine tag (6His-tag) onto the MNPs. Our developed methodology enables the oriented bioconjugation of His-tagged cadherins to MNPs while preserving protein functionality and the colloidal stability of the MNPs and could be extended to other proteins expressing a polyhistidine tag. Additionally, our strategy allows for the precise control of the protein density on the MNPs surface, enabling the selective targeting of E-cadherin-expressing cells only when MNPs are decorated with a high density of cadherin fragments.

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